

Pythagorean Theorem

8th
Grade

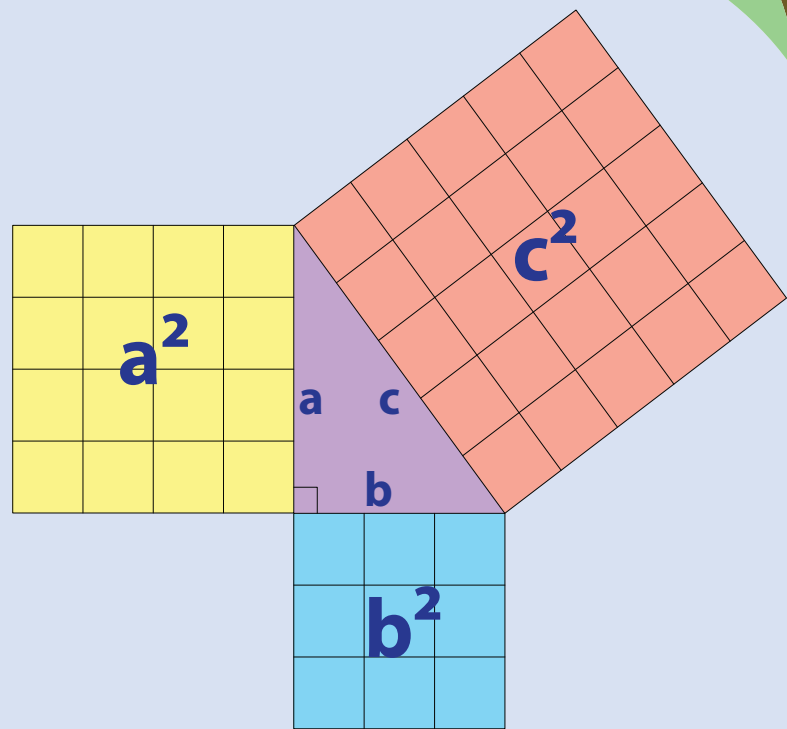
Pythagorean Triples

(3, 4, 5) (6, 8, 10)

(5, 12, 13) (7, 24, 25)

(8, 15, 17) (9, 12, 15)

(10, 24, 26) (12, 35, 37)

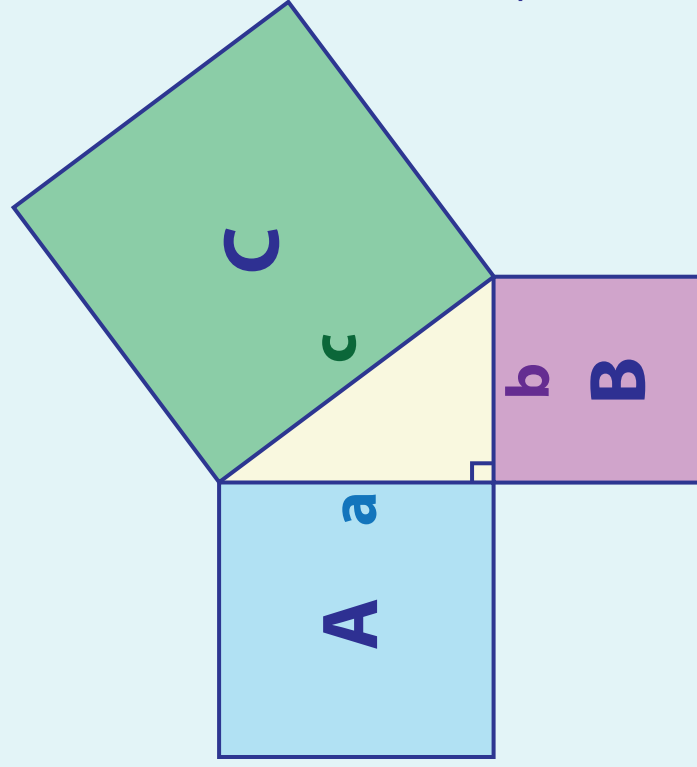


$$a^2 + b^2 = c^2$$

Workbook 1

Pythagorean Theorem

The area of the square on the hypotenuse equals the sum of the areas of the squares on the other two sides.



Here, **c** is the hypotenuse. Sides **a** and **b** represent the legs of the right triangle.

Area of the square **A** = **a** × **a** = **a²**

Area of the square **B** = **b** × **b** = **b²**

Area of the square **C** = **c** × **c** = **c²**

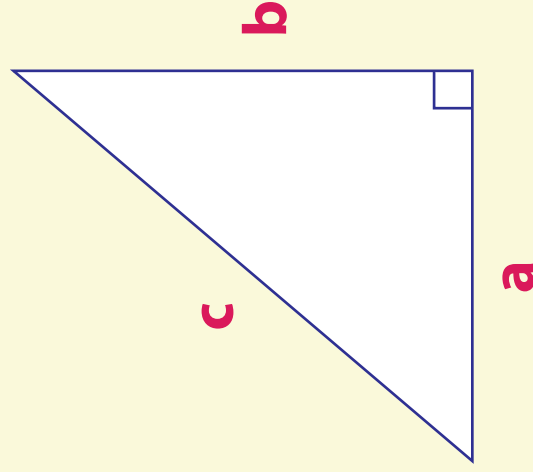
The theorem relating the lengths of the sides **a**, **b** and **c**, can be written as an equation called the "**Pythagorean equation**".

$$a^2 + b^2 = c^2$$

$$a^2 + b^2 = c^2$$

Pythagorean Triples

If three positive integers (a , b , and c) that represent the length of each side of a right triangle, satisfy the equation $a^2 + b^2 = c^2$, it is called a Pythagorean triple.



Pythagorean triple formula for every odd number.

- * side a is an odd number.
- * side $b = \frac{(a^2 - 1)}{2}$ (even number)
- * side $c = (b + 1)$ (odd number)

Pythagorean triple formula for every even number.

- * side a is an even number.
- * side $b = \left(\frac{a}{2}\right)^2 - 1$ (odd number)
- * side $c = (b + 2)$ (odd number)

In a Pythagorean triple, two sides will always be represented by odd numbers and one side will be an even number.

Pages 3 to 6 are available only for members.

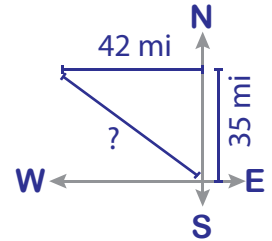
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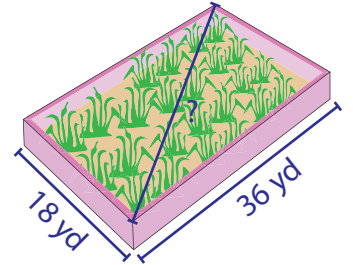
Pythagorean Theorem

Solve the word problems. Round the answer to the nearest tenth.

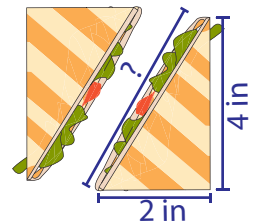
- 1) Mark is on his way home from work. He drives 35 miles due North and then 42 miles due West. Find the shortest distance he can cover to reach home early.



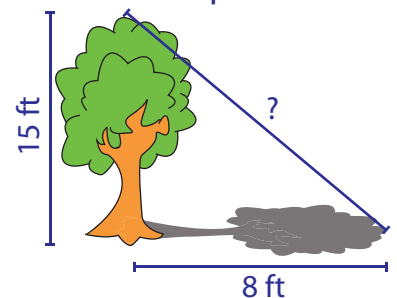
- 2) Mr. Richard owns an orchard that has a rectangular fence. The orchard is 36 yards long and 18 yards wide. If he walks across the diagonal length of the orchard, how much distance would he cover?



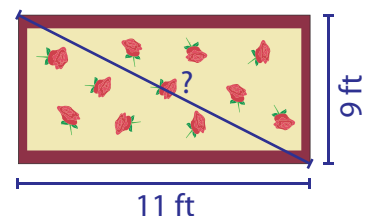
- 3) Joey made a sandwich that was 2 inches long and 4 inches high. If he cuts the sandwich in half as shown in the figure, what would be the diagonal length of the sandwich?



- 4) A 15 feet tree casts a shadow that is 8 feet long. What is the distance from the tip of the tree to the tip of its shadow?



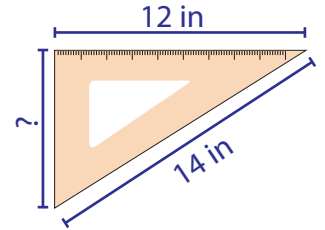
- 5) Rachel bought a rug for her apartment. The rug is 11 feet long and 9 feet wide. Find the diagonal length of the rug.



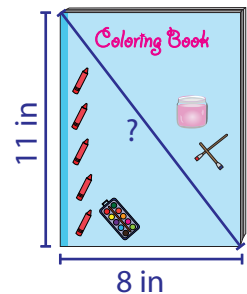
Pythagorean Theorem

Solve the word problems. Round the answer to the nearest tenth.

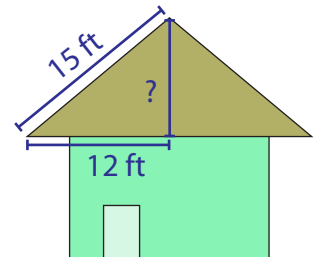
- 1) Ruth develops a blueprint with the help of a triangle. The longest side of the instrument measures 14 inches and one of the sides measures 12 inches. Determine the length of the other side of the instrument.



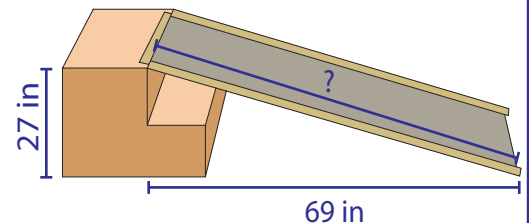
- 2) Carol bought a coloring book. It is 11 inches long and 8 inches wide. What is the diagonal length of the book?



- 3) The slope of the rafter is 15 feet. Half the run of the rafter measures 12 feet. Find the height of the ridge from the base.



- 4) A ramp is elevated to a height of 27 inches from the base. The horizontal distance between the lower end of the ramp and the base is 69 inches, as shown in the figure. What is the length of the ramp?



- 5) Ashley has a right triangular garden in her backyard. The longest side of the garden measures 17 yards. One of the sides is 10 yards long. Find the length of the other side of the garden.

